

## WHAT IS CLAIMED IS:

1. An image processing apparatus for subjecting color image data constituted of three primary colors to black ink addition, said apparatus comprising:

5 black ink generating means for generating a black ink signal in accordance with a difference between a maximum value and a minimum value among three values indicating the three primary colors for each pixel in said color image data, and said minimum value.

10 2. The image processing apparatus according to claim 1, wherein said color image data is the three primary colors of cyan, magenta, and yellow.

15 3. An image processing apparatus for subjecting color image data constituted of three primary colors to black ink addition, said apparatus comprising:

20 address generating means for generating an address based on a difference between a maximum value and a minimum value among three values indicating the three primary colors for each pixel in said color image data, and said minimum value;

a lookup table in which data is read from the address generated by the address generating means; and

black ink generating means for generating a black ink signal based on the data read from the lookup table.

25 4. The image processing apparatus according to claim 3, wherein said lookup table is a two-dimensional lookup table.

5. The image processing apparatus according to  
claim 3, wherein said lookup table stores a data group  
monotonously decreasing with an increase of said  
maximum value when said minimum value is constant, and  
stores a data group monotonously increasing with the  
increase of said minimum value when said difference  
between the maximum value and the minimum value is  
constant, and the data is read from said address.

10 6. An image processing apparatus for subjecting  
color image data constituted of three primary colors to  
black ink addition, said apparatus comprising:

15 undercolor generating means for generating an  
undercolor signal in accordance with a difference  
between a maximum value and a minimum value among three  
values indicating the three primary colors for each  
pixel in said color image data, and said minimum value;  
and

20 correcting means for correcting the three values  
indicating the three primary colors for said each pixel  
based on the undercolor signal generated by the  
undercolor generating means.

25 7. An image processing apparatus for subjecting  
color image data constituted of three primary colors to  
black ink addition, said apparatus comprising:

address generating means for generating an address  
based on a difference between a maximum value and a  
minimum value among three values indicating the three

primary colors for each pixel in said color image data, and said minimum value;

a lookup table in which data is read from the address generated by the address generating means;

5 undercolor generating means for generating an undercolor signal based on the data read from the lookup table; and

10 correcting means for correcting the three values indicating the three primary colors for said each pixel based on the undercolor signal generated by the undercolor generating means.

8. An image processing apparatus for subjecting color image data constituted of three primary colors to black ink addition, said apparatus comprising:

15 address generating means for generating an address based on a difference between a maximum value and a minimum value among three values indicating the three primary colors for each pixel in said color image data, and said minimum value;

20 a lookup table having a storage capacity of a number obtained by totaling a number at which said difference between the maximum value and the minimum value is an integral multiple of a predetermined value and a number at which the difference is other than the integral multiple and said maximum value is equal to a maximum value of a defined region, and in which data is read from the address generated by said address

generating means; and

black ink generating means for outputting the data read from said lookup table as a black ink signal when said difference between the maximum value and the 5 minimum value is the integral multiple of the predetermined value or when said maximum value is equal to the maximum value of the defined region, and for interpolating/generating and outputting the black ink signal from the data read from said lookup table and 10 data read from an address adjacent to said address when said difference between the maximum value and the minimum value is not the integral multiple of the predetermined value and when said maximum value is not equal to the maximum value of the defined region.

15 9. An image processing apparatus for subjecting color image data constituted of three primary colors to black ink addition, said apparatus comprising:

address generating means for generating an address based on a difference between a maximum value and a 20 minimum value among three values indicating the three primary colors for each pixel in said color image data, and said minimum value;

a lookup table having a storage capacity of a number obtained by totaling a number at which said 25 difference between the maximum value and the minimum value is an integral multiple of a predetermined value and a number at which the difference is other than the

integral multiple and said maximum value is equal to a maximum value of a defined region, and in which data is read from the address generated by said address generating means;

5                   undercolor generating means for outputting the data read from said lookup table as an undercolor signal when said difference between the maximum value and the minimum value is the integral multiple of the predetermined value or when said maximum value is equal to the maximum value of the defined region, and for  
10                   interpolating/generating and outputting the undercolor signal from the data read from said lookup table and data read from an address adjacent to said address when said difference between the maximum value and the minimum value is not the integral multiple of the predetermined value and when said maximum value is not equal to the maximum value of the defined region; and  
15                   correcting means for correcting the three values indicating said three primary colors based on the undercolor signal outputted from the undercolor generating means.

20                   10. An image processing apparatus for subjecting color image data constituted of three primary colors to black ink addition, said apparatus comprising:

25                   first generating means for generating a first undercolor component based on a difference between a maximum value and a minimum value among three values

IMAGE PROCESSING APPARATUS

indicating the three primary colors for each pixel in said color image data, and said minimum value;

5 second undercolor generating means for generating a second undercolor component based on the three values indicating the three primary colors for each pixel in said color image data;

10 first subtracting means for subtracting the first undercolor component generated by said first generating means from the three values indicating the three primary colors for each pixel in said color image data;

15 second subtracting means for subtracting the second undercolor component generated by said second undercolor generating means from a predetermined first constant; and

20 calculating means for outputting a calculation result obtained by multiplying a predetermined second constant by a subtraction result of said first subtracting means and further dividing a multiplication result by the subtraction result of said second subtracting means.

11. The image processing apparatus according to claim 10, wherein said first constant and the second constant have values both larger than the maximum value of the defined region of said three primary colors.

25 12. The image processing apparatus according to claim 10, wherein said first constant and the second constant are equal to each other, and have values both

larger than the maximum value of the defined region of said three primary colors.

13. The image processing apparatus according to claim 10, wherein said second undercolor component is  
5 smaller than the first undercolor component.

14. An image processing apparatus for subjecting color image data constituted of three primary colors to black ink addition, said apparatus comprising:

10 identifying means for identifying a pixel attribute of each pixel in said color image data and outputting a pixel attribute signal;

15 first address generating means for generating a first address based on a difference between a maximum value and a minimum value among three values indicating the three primary colors for each pixel in said color image data, and said minimum value;

a first lookup table in which data is read from the first address generated by the first address generating means;

20 processing means for generating a prospective first black ink signal based on the data read from the first lookup table;

25 second address generating means for generating a second address based on the three values indicating the three primary colors for each pixel in said color image data;

a second lookup table in which data is read from

the second address generated by the second address generating means; and

black ink signal selecting means for selecting/outputting either one of the data read from 5 the second lookup table and the prospective first black ink signal generated by said processing means as a black ink signal in accordance with the image attribute signal of the pixel outputted from said identifying means.

10 15. An image processing apparatus for subjecting color image data constituted of three primary colors to black ink addition, said apparatus comprising:

identifying means for identifying a pixel attribute of each pixel in said color image data and 15 outputting a pixel attribute signal;

first address generating means for generating a first address based on a difference between a maximum value and a minimum value among three values indicating the three primary colors for each pixel in said color 20 image data, and said minimum value;

a first lookup table in which data is read from the first address generated by the first address generating means;

processing means for generating a prospective 25 first undercolor signal based on the data read from the first lookup table;

second address generating means for generating

a second address based on the three values indicating the three primary colors for each pixel in said color image data;

5 a second lookup table in which data is read from the second address generated by the second address generating means;

10 undercolor signal selecting means for selecting/outputting either one of the data read from the second lookup table and the prospective first undercolor signal generated by said processing means as an undercolor signal in accordance with the image attribute signal of the pixel outputted from said identifying means; and

15 correcting means for correcting the three values indicating said three primary colors based on the undercolor signal selected/outputted from the undercolor signal selecting means.

16. An image processing apparatus for subjecting color image data constituted of three primary colors to black ink addition, said apparatus comprising:

identifying means for identifying a pixel attribute of each pixel in said color image data and outputting a pixel attribute signal;

25 first undercolor generating means for generating a first undercolor component based on three values indicating the three primary colors for each pixel in said color image data;

second undercolor generating means for generating a second undercolor component based on the three values indicating the three primary colors for each pixel in said color image data;

5           third undercolor generating means for generating a third undercolor component based on the three values indicating the three primary colors for each pixel in said color image data;

10           first subtracting means for subtracting the first undercolor component generated by said first undercolor generating means from the three values indicating the three primary colors for each pixel in said color image data;

15           second subtracting means for subtracting the second undercolor component generated by said second undercolor generating means from a predetermined first constant;

20           first calculating means for outputting prospective first corrected three primary colors obtained by multiplying a predetermined second constant by a subtraction result of said first subtracting means, and further dividing a multiplication result by the subtraction result of said second subtracting means;

25           second calculating means for subtracting said third undercolor component from the three values indicating the three primary colors for each pixel in said color image data and outputting prospective second

corrected three primary colors; and

selecting means for selecting/outputting either  
one of the prospective second corrected three primary  
colors outputted from the second calculating means and  
5 the prospective first corrected three primary colors  
outputted from said first calculating means as  
corrected three primary colors in accordance with the  
image attribute signal of the pixel outputted from said  
identifying means.